Chapter 7

ENVIRONMENTAL CONSIDERATIONS

This chapter discusses military operations in a variety of environments. Such operations include military operations on urban terrain and amphibious, cold weather, and jungle operations.

MILITARY OPERATIONS ON URBAN TERRAIN (MOUT)

The tremendous growth of urban areas worldwide continues to reduce the amount of open, maneuverable terrain available to attacking or defending forces. Many areas form giant urban obstacles extending many kilometers.

Generally, giant urban areas are located on or near traditional movement corridors in regions rich in natural or industrial resources. They play important roles in the economic and political life of many countries. Consequently, there are many areas where units may have to attack or defend a city.

Division commanders and staffs must understand the complexities and problems of MOUT. Doctrine applicable to the open battlefield is equally applicable to the urban battlefield. The decision-making methodology for developing and war-gaming COAs remains the same. Only METT-T factors change.

Isolation characterizes the urban battlefield. Therefore, urban battle requires psychologically strong leaders with positive attitudes. The MOUT battle is the type of fighting at which properly supported infantry units excel.

Field Manuals 90-10 and 90-10-1, the current doctrinal references for MOUT, focus on battalion and lower levels. This section provides division-level commanders and staffs a summary of MOUT TTPs.

The AASLT Division's Role

The AASLT division conducts both offensive and defensive operations in urban areas. The division can conduct operations against a combination of armored and light forces to-

- Control avenues of approach.
- Act as a combat multiplier by freeing more mobile armored forces to act as a reserve force as part of a corps or Army plan.
- Retain key transportation or economic centers.
- Protect or hide the force.
- Deny strategic or political objectives to the enemy.

Commanders and staffs conducting mission analysis for MOUT consider—

- Diverse IPB requirements.
- Special C^2 requirements.
- Unique task-organization requirements.
- Fire support capabilities and limitations.
- Weapons effectiveness.
- Special considerations for CHS and logistic support.
- Special equipment for urban operations.
- Control measures.

Intelligence Preparation of the Battlefield

The IPB process for the urban battlefield follows standard doctrinal methodology. However, the nature of urban warfare requires additional information the IPB process does not normally generate, including—

- Information on underground passages, such as sewers, subways, heating tunnels, water, and electrical conduits, which the enemy or friendly forces might use for intracity movement.
- Information on water supplies and electrical power generation and distribution systems.
- City maps and aerial photographs denoting building heights, overhead obstacles, bridges (and

their locations and capacities), hospitals, and other special-purpose buildings.

- Detailed building and bridge analyses and data on building survivability and structural integrity.
- Grid or area shutoffs for power, water, gas, and other utilities.
- Information on factories and other types of industry that might impact operations, including refineries, rail yards, heavy equipment suppliers, industrial complexes, and medical facilities. (The G2 conducts a careful analysis to determine if use of these facilities will assist or hinder operations.)
- Information on communications systems that might aid C^2 or the control of which might deny a hostile populace or enemy the ability to rapidly disseminate information. (Systems include telephone systems, radio and television transmitters, and microwave and satellite relay facilities.)
- Information on local civil authorities, political leaders, and the population. Planning for refugee problems and evacuation is critical to both offensive and defensive operations. A detailed civil affairs action plan is essential.

Command and Control

Urban combat is one of the most difficult missions infantry forces execute. Centralized planning and decentralized execution is critical. Terrain isolation, the dominant characteristic of urban combat, and difficulties in communicating by tactical radio hinder C^2.

Planning for C^2 includes using all communications systems, including existing telecommunications systems and TACSAT radios, to link divisions, brigades, and battalions; FM radios; and tactical wire, Using other devices, such as remotely piloted vehicles (RPVs), sensor strings, or remote video links, provides the commander real-time intelligence as well as the means for calling for and adjusting fires.

Task Organization for Combat

In developing effective task organizations for MOUT, commanders and staffs recognize urban warfare's unique challenges. Conventional task organizations may not be effective. Combat and CS assets, such as engineers and MI, may receive nonstandard missions.

Fire Support Capabilities and Limitations

Urban terrain increases the difficulty of fire support planning and execution. Man-made structures can be obstacles to effective artillery fire support by masking effective fire (even when artillery uses high-angle fire).

DIVARTY may have to limit positioning of DS artillery to large parks and athletic fields and may require positioning outside of a city to provide massed fires inside or on avenues of approach to the front. Batteries may have to be in nonstandard firing configurations to fit urban terrain. They may also have to operate in a direct-fire mode in the offense to reduce enemy strongpoints. Subordinate maneuver units may have to rely on organic mortars for much of their indirect-fire support.

In both the defense and offense, the division uses a standard building marking system when calling for and adjusting fire support by aircraft. In the defense, this system may actually include marking building tops.

Units can pinpoint building locations using the global positioning system (GPS) to facilitate precision fire support. There may also be more RFAs, such as areas near hospitals, churches, and shrines. Division staffs disseminate information on these areas to the lowest levels.

Weapons Systems Effectiveness

Leaders give special consideration at brigade and battalion levels to the positioning and use of organic weapons systems. The restrictive nature of city streets could make it impossible to employ TOW and DRAGON AT systems to achieve the 65-meter minimum arming distance and still place effective fire on enemy armored vehicles. When fired at defensive positions in buildings, the warhead in these and other AT missiles makes them less effective than 105-millimeter howitzers.

Time and proximity fuzes enhance the effectiveness of artillery fired at the enemy on rooftops and behind barricades. If 155-millimeter or 203-millimeter SP howitzers are available to the division in

the offense, they are effective direct-fire weapons, particularly against bunkers and entry points.

Tanks and Bradley fighting vehicles (BFV) can be extremely effective in support of both offensive and defensive operations. Tank main guns generally do not make good entry-point holes in buildings, but can prove effective when tired at point targets. Units should use HE ammunition in most cases.

Tanks can destroy steeples, tall chimneys, and other structures containing enemy artillery observers. The tank's greatest value may be its mobile machine gun support to maneuvering infantry. With two 7.62-millimeter and one .50-caliber machine guns, two tanks have the mobile machine gun firepower of an AASLT company.

The division can use attack helicopters to detect and eliminate enemy strongpoints. If terrain permits, they can also provide precise fire support. Like armored forces, attack helicopters play a decisive role in interdicting attacking enemy forces and their LOCs.

When the division defends strongpoints, AT mines will be more difficult to emplace and conceal in urban areas. Consequently, they will have a degraded effectiveness. The use of antipersonnel (APERS) mines inside buildings may be more effective.

Combat Service Support

Casualties are high in city battles. Evacuation, especially aerial evacuation, is extremely difficult and even impossible in some areas. Therefore, units position treatment squads with physicians and physician assistants well forward in the offense, or establish them throughout the city in the defense. MEDEVAC routes and casualty collection points may be more difficult to coordinate because of obstacle belts and battle-induced rubble.

City battles greatly affect logistic support. They cause fluctuating changes in demand for such items as small arms, grenades, 40-millimeter projectiles, mines, mortar ammunition, light AT weapons, and demolition equipment.

Because of changes in consumption rates, units may not properly forecast ammunition requirements. As a result, DISCOM units must push (not pull) resupply. Where possible, units should stockpile supplies and ammunition in the defense.

Large numbers of displaced persons can also adversely affect the division supply system. Fighting in urban areas may increase the consumption rate for expendable supplies such as uniforms, boots, and load-bearing equipment (LBE).

Special Equipment Requirements

A division fighting in a city may need special equipment. At battalion level, this maybe shotguns, body armor, additional sniper weapons, and more concussion, smoke, and fragmentary grenades. At the division level, the commander and staff may need additional communications assets.

The AASLT division does not have enough wire and telephones to effectively wire-in a city defense. Since such assets may not be available, the division may need more TACSAT radios.

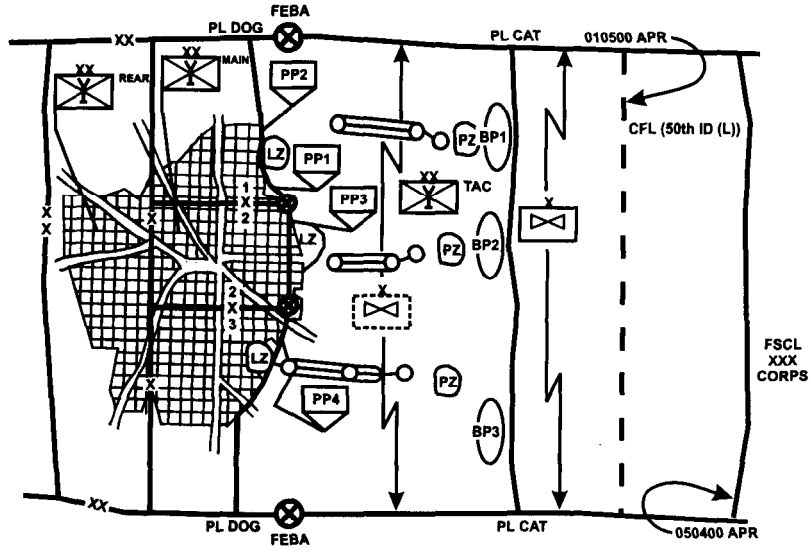
Control Measures

Combat in urban areas requires the same control measures as operations in other terrain. However, in the urban fight, some control measures are easier to identify. Others, such as frontages and zones of action, boundaries, checkpoints, contact points, PLs, and objectives, may be more difficult.

In the offense, the division normally assigns to the brigade narrow *zones of action* based on enemy strength, size of buildings, and levels of expected resistance. An attacking brigade TF may have a *frontage* of from 6 to 12 city blocks. Frontages and AOs influence formations. In the urban battle, commanders should maintain a significant reserve well forward.

Boundaries should be easily identifiable. No strict rules apply to boundaries, except one unit should control approaches. In dense urban areas, boundary placement is most often along one side of a street. Boundary placement may also allow one unit to include both sides of a street. Boundaries should never divide a major avenue of approach.

Street comers, railway crossings, buildings, bridges, and other easily identifiable features can function as *checkpoints* and *contact points.*



Techniques: Phase I

- The concept is to defend forward and displace to well-prepared defensive positions.
- Aviation helps with the withdrawal.
- The aviation brigade screens forward of PL CAT, which becomes the CFL as the force withdraws from battle positions.
- Aviation assets continue to screen as brigades and battalions withdraw into the urban area.

Figure 7–1. Example defensive MOUT operation: Phase I

Phase lines increase control. In the offense, they assist in regulating the advance of attacking forces and synchronizing the battle. In the defense, they assist in reporting enemy penetrations and may serve to trigger command decisions. Streets, rivers, trolley, and railroad lines make easily recognizable PLs.

Unit *objectives* can have several characteristics. They can be a specific object, such as a principal building, or a specific area, such as a petroleum tank farm. They can also be several buildings located around a major intersection. If the commander's intent is to clear in zone up to a specific point, a limit of advance may be more appropriate than an objective.

Defensive Operations

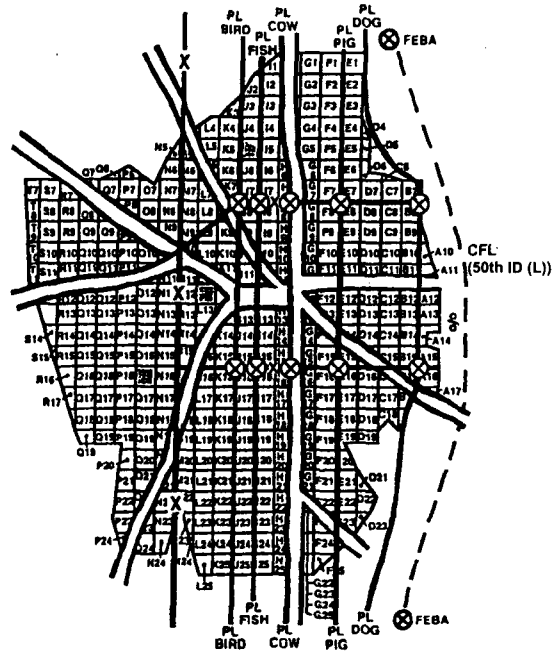
Built-up areas present obstacles to an attacking force while providing the defender an advantage and some protection. A small, well-prepared force in an urban defense can defeat or hold off a much larger attacking force.

Strongly constructed cities give the defender a decided advantage. Each building or group of buildings is a potential strongpoint.

With additional construction and the use of barricades, mines, and booby traps, an urban area can become a veritable fortress. Under some conditions, division elements may hold built-up areas while the remainder of the division defends from adjacent restrictive terrain.

The following are techniques and guidelines for defensive MOUT operations:

- Establish defenses in depth in built-up areas starting far forward and including approaches to the urban area.
- Integrate adjacent terrain into the defense.
- Use security forces operating in depth to counter enemy ground reconnaissance and infiltration.
- Use restrictive missions and detailed control measures to facilitate decentralized execution.
- Establish checkpoints to control access to the urban area.



Techniques: Phase II

- The objective is an enlargement of the urban area.
- *The division assigns alphanumeric designations to each city block.*
- The brigade numbers all buildings, houses, and structures, preserving no-fire areas (NFAs) (*hospitals and cultural and religious areas*).
- Once inside the urban area, the far sides of blocks (the enemy's sides of streets) are the CFL during withdrawal.
- The brigade develops CFL; the division consolidates them.
- The boundary shift for the 1st Brigade is behind PL BIRD to the brigade rear boundary.

Figure 7–2. Example defensive MOUT operation: Phase II

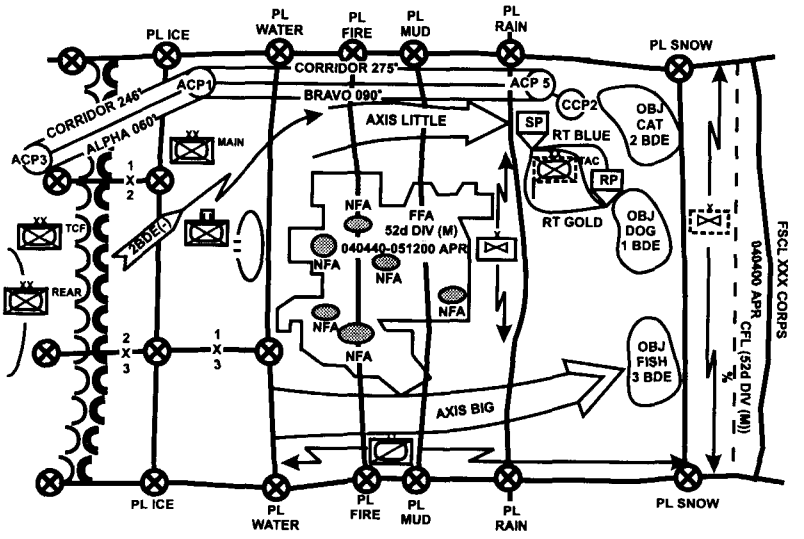
- Employ the combined-arms team to maximize individual unit capabilities.
- Emplace obstacles along major avenues of approach.
- Maintain a strong, mobile reserve to counter-attack and block penetrations.

Figures 7-1 and 7-2 are examples of defensive MOUT operations.

Offensive Operations

A detailed study of an urban area and enemy dispositions in and around it forms the basis for planning the attack. As in any attack, planning must provide for both maneuver and fire support. The following are proven techniques and guidelines for conducting offensive MOUT operations:

- Attack a built-up area only as the last resort and only when major advantage accrues through its seizure or control.
- Know the characteristics of urbanized terrain and the advantages and disadvantages it offers to either attacker or defender.
- Attack where the enemy is weak, hitting his flanks and rear simultaneously.
- Conduct detailed planning to enhance decentralized execution and to minimize C^2 problems.
- Employ the combined-arms team to maximize capabilities and minimize vulnerabilities.



Techniques:

- The division assigns alphanumeric designations to each block.
- The brigade numbers all buildings, houses, and structures and submits this information to the division.
- The brigade develops CFL; the division consolidates them.

Phase I: Isolate

- Commander's intent is to have a mechanized division rapidly bypass the town; success is preventing escape, withdrawal, or reinforcement.
- Designating objectives facilitates reorientation for phases II and III.
- The PL, used as the CFL, is adjusted through the execution matrix as maneuver units approach.
- The aviation brigade—
  —Prevents enemy reinforcement.
  —Prevents escapes, withdrawal (critical to future corps operations).
  —Covers movement into objectives DOG and CAT.

Figure 7–3. Example offensive MOUT operation: Phase I

- Dissipate an enemy's strength by causing him to react to demonstrations, feints, or ruses.
- Maneuver over approaches to a built-up area with smoke protection and overmatching fires.
- Reduce strongpoints with fires where possible, then while continuing to move, secure them with follow-on forces.
- Cut LOCs and defeat the enemy through isolation.
- Attack at night to gain surprise and maximize the night technology advantage of US forces.
- Keep the attack continuous until attacking forces splinter defenses once they achieve momentum.

Figures 7-3 through 7-5 are examples of offensive MOUT operations.

Attacks in MOUT normally have three phases (isolate, gain foothold and syystematic clearing). Phase I is isolating the city and seizing terrain features dominating approaches. The division secures positions outside the built-up area from which to support entry into the city itself. Tactics and techniques are similar to those of attacks against other well-organized enemy positions.

In phase II, the division advances to the edge of the built-up area and gains a foothold while eliminating the defender's observation and direct fires on approaches into the area. From the foothold area, the attacking unit penetrates on a narrow front with tanks and infantry leading, where possible.

Supporting fires on entry points focus on the front and on preventing flank attacks. Assaulting forces can expect to encounter barricades, AT obstacles,

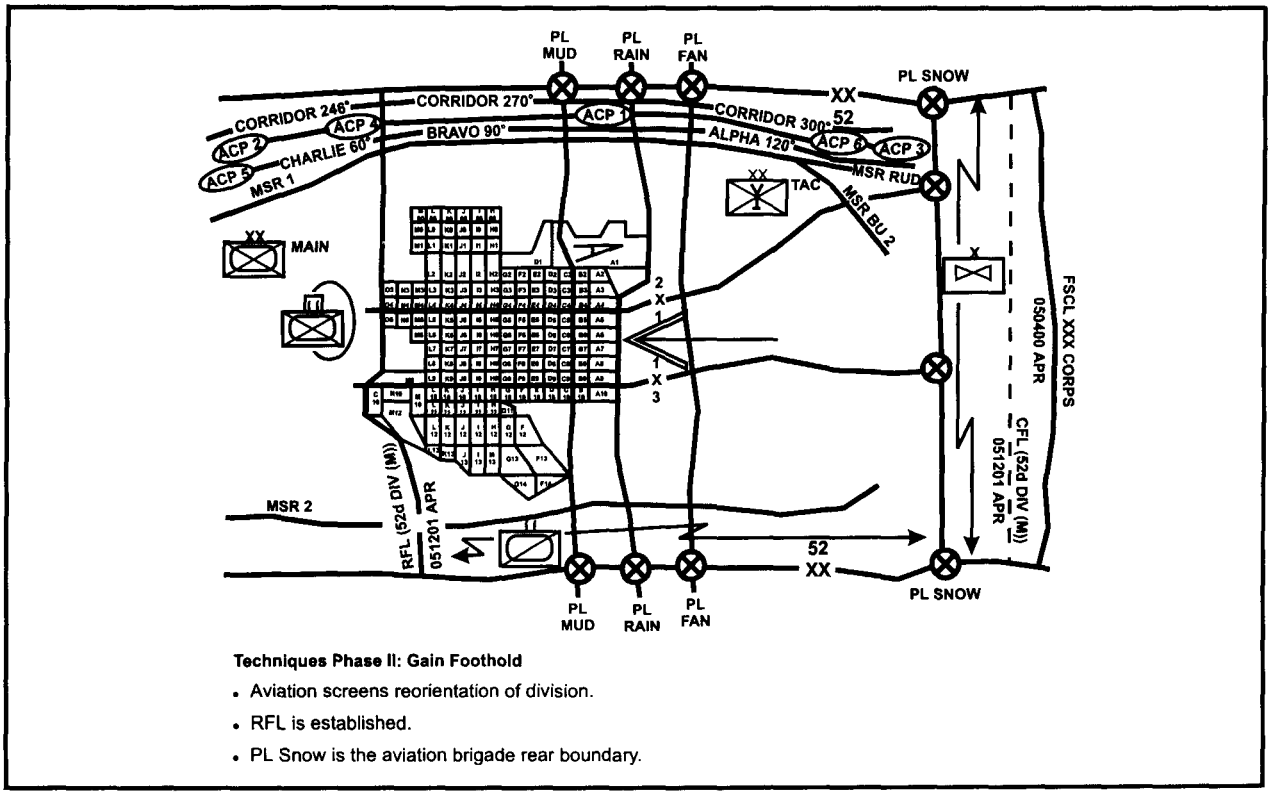


Figure 7–4. Example offensive MOUT operation: Phase II

mines, booby-traps, and AT fire. The probability of success increases if assaulting forces launch-the attack from an unexpected direction during periods of limited visibility or under cover of smoke.

Phase III varies from a systematic, block-by-block, house-to-house reduction of the built-up area to a rapid advance while clearing only critical areas and buildings. Phase III begins without pause after phase II. Clearance and seizure techniques depend on METT-T.

When the built-up area is large and heavily fortified and the mission requires a methodical house-by-house, block-by-block clearance operation, the division divides the area into brigade zones of responsibility. Each subordinate unit clears its zone completely, leaving no enemy to its rear.

There may be occasions, such as in Panama in 1989, where light forces deploy in support of national objectives to eliminate a hostile military or oppressive paramilitary force. Under such circumstances, a large percentage of the population may actually be sympathetic to US policy and objectives.

Restrictive ROE normally characterize such actions, which may be part of a noncombat evacuation operation (NEO). In such cases, the situation may warrant a graduated response. This may include a demonstration using the precision fires of attack cargo (AC)-130s, AH-64s, or field artillery in proximity to, but not actually on, hostile forces in an attempt to convince them to capitulate.

Operation Just Cause provides several excellent examples in which a graduated response resulted in the surrender of enemy forces. In one instance, US Army Rangers used the precision fire of an AC-130 to convince a Panamanian garrison to surrender. Rangers had the garrison commander call other Panamanian units and report what he saw. The result was the surrender of several other units without any direct confrontation.

In addition to preserving life on both sides, a graduated response may also help build or retain the sympathy of a local population by limiting physical damage and loss of life. A graduated response maximizes economy of force.

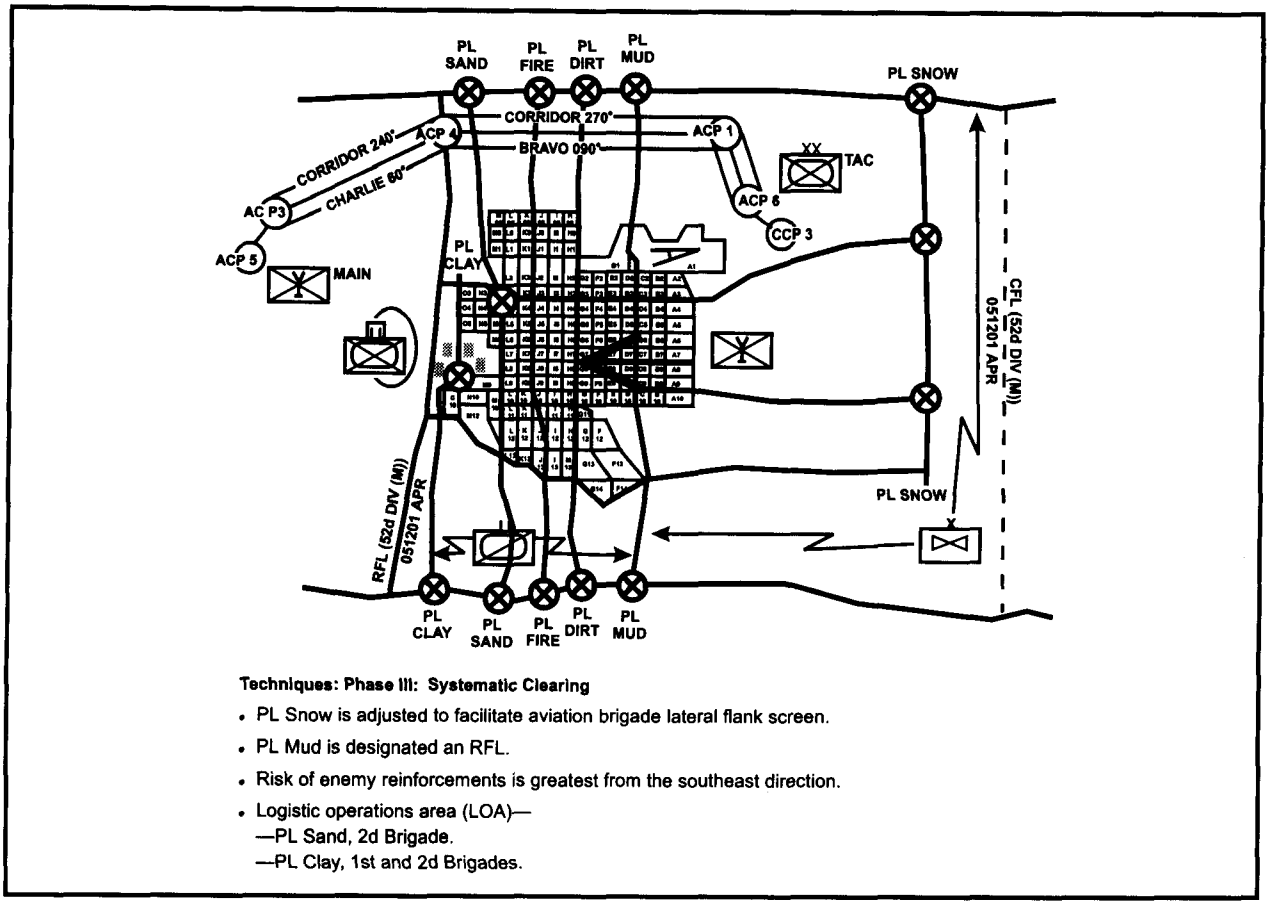


Figure 7–5. Example offensive MOUT operation: Phase III

WINTER AND COLD WEATHER OPERATIONS

Extreme cold weather conditions pose significant operational problems for the AASLT division. In temperate climates, many conditions have minimal operational impact; in the cold, however, they are a matter of life and death. Proper equipment, training, and strong leadership can overcome cold weather problems and complications. World Wars I and II and the Korean War included cold weather operations. Ten German divisions operated under arctic conditions in northern Finland during WWII in an area about 400 miles wide. The Russian Army used 47 divisions in winter operations against Finland in 1939. Future global or regional conflicts may require division operations in winter or cold weather environments.

Field Manual 90-11 is the Army's base doctrine on cold weather operations. This section provides an overview of environmental considerations for such operations.

The Commander

The commander must approach operations in cold weather in a positive manner, exploiting advantages and reducing disadvantages as much as possible. He must emphasize the feasibility of operations and transmit his confidence to his subordinates.

The commander faces no changes in doctrine or principles and, in general, uses tactics suitable for the terrain. However, operations in cold weather regions pose additional difficulties which greatly complicate C^2, maneuver, fire support, and CSS missions.

Although the fundamental principles of warfighting apply unchanged, special characteristics of operations in cold weather increase the commander's responsibilities. He must consider the use of special

clothing and equipment as well as expedients and improvisations for living and moving in the cold. With proper training, suitable equipment, and effective, resourceful leadership, the AASLT division can operate in the cold without significant loss of strength or effectiveness.

Winter and Cold Weather Considerations

Whiteout

A whiteout is an atmospheric phenomenon in which the light from the sky is about equal to that of the snow surface. A uniformly white glow appears to engulf observers. Whiteout occurs over unbroken snow cover and beneath a uniformly overcast sky.

Blowing snow can also cause whiteout. Shadows, the horizon, and clouds are no longer visible. Observers lose depth perception and become disoriented. They can only see dark and nearby objects.

These conditions affect observers in the air as well as on the ground and increase soldier fatigue. Whiteout most commonly affects helicopters during slow movement close to the ground's surface.

Grayout

Grayout occurs over a snow surface during twilight conditions, when the sun is close to the horizon, or when the sky is overcast with dense clouds. Surroundings have an overall grayness.

The absence of shadows causes a loss of depth perception and increases the hazards of landing aircraft, driving a vehicle, or even walking. Under certain grayout conditions, drivers find it almost impossible to distinguish the road from a ditch or from snowbanks along the roadside.

Grayout is similar to whiteout. In grayout conditions, the horizon is distinguishable; during a whiteout, it is not. This condition can be overcome by using night vision devices (NVDs).

Ice Fog

Ice fog is common in inhabited areas when temperatures drop below minus 35 degrees Fahrenheit. At such temperatures stagnant air cannot hold the water vapor which human activities produce; the vapor materializes as ice fog.

Sources of water vapor include vehicle and aircraft exhaust, steam from heating systems, and even air from humid rooms. In the field such fogs may appear over troops, bivouac areas, motor parks, airfields, convoys, and gun positions, disclosing the area of military activity.

Ice fog can obscure a gunner's vision even with a thermal sight. When combined with soft snow blown up by muzzle blast, the condition may require a gunner to move to another position after the first shot .

Ice fog can limit or negate the effectiveness of NVDs. It also precludes both rotary- and fixed-wing aviation operations.

Snow Cover

Snow cover increases the possibilities for movement and operations of suitably equipped and trained AASLT troops. However, it significantly reduces the mobility of a force which lacks proper equipment and training.

Snow over one meter deep stops all wheeled-vehicle movement except on established roads and in rear areas. Full-tracked vehicles with low ground pressures are best for moving over snow-covered or muddy terrain.

Deep snow can also limit depth in combat missions because it slows movement. Snow depths over 24 inches almost entirely stop movement on foot without the aid of snowshoes.

Reconnaissance by patrols on skis, snowshoes, or in light oversnow vehicles should precede unit movement. Reconnaissance reports should include information on snow depth and ice thickness.

Snow and ice increase maintenance requirements of equipment and weapons systems. Snow cover also reduces the effect of all weapons fires, including artillery or mortar tire.

Ice Cover

The freezing of rivers, lakes, and swamps can increase the possibilities for maneuver. Waterways that are normally obstacles in summer can become frozen routes of advance and LOCs in winter,

making extensive cross-country movement possible. However, such routes are also open to the enemy.

Extreme Cold

Extreme cold slows activities by numbing soldiers and increasing the need for maintenance of weapons and materiel. Activities which normally require only minutes may require hours in extreme cold. Oversnow movement is extremely slow and requires periodic stops to set up warming tents for thawing water and rations and for soldiers to combat the effects of numbing cold.

Troops require special clothing and heated shelters. They must also protect some equipment and supplies against freezing temperatures.

Extreme cold makes metal extremely brittle, increasing breakage of parts in all types of weapons. Soldiers must winterize their weapons and vehicles with special lubricants. However, bringing a cold weapon into a warm shelter causes condensation on the weapon which can freeze and cause a malfunction when it returns to the cold. Consequently, weapons are normally left outdoors unless brought in for maintenance. Extreme cold also decreases ammunition velocity and accuracy.

The commander must consider the following factors during planning: proper planning and suitable clothing, supplies, equipment, shelter, transportation, intensified training, and any impact for conducting AASLT operations without soldier rucks when the SOP dictates.

Daylight and Darkness

Winter in arctic and subarctic regions brings decreased daylight and in some areas no daylight. Conversely, summer has long periods of daylight.

The commander must not regard unusually long periods of either daylight or darkness as a bar to operations. In some situations, these conditions can actually aid operations.

Low-Population Density and Transportation Routes

In artic regions there will be few settlements, supplies, quartering facilities, and LOCs. Therefore, their control or destruction maybe critical. Also, there are few roads and railroads and those that exist usually are vulnerable to enemy action. In addition, climatic conditions may greatly affect their use.

Lakes and waterways may either aid or hinder operations. Units can use them as natural routes of communications or airstrips if covered with ice of sufficient thickness. However, drifted and hard-packed snow may make landing on ice difficult and require engineer preparation of an airstrip.

In the summer, waterways may be either major barriers or LOCs. Many rivers and streams are glacier-fed and carry great volumes of water and silt in summer. The amount of water may vary considerably during any 24-hour period. This is particularly true near a river's source when daytime temperatures are warm and nighttime temperatures are near freezing. Units must conduct continuous, careful reconnaissance to determine water volume changes throughout the day.

Mapping and Navigation

In some regions land navigation is difficult. Lack of landmarks, the presence of large forested areas, periods of reduced visibility, difficulty of cross-country movement, changes in terrain features because of blowing sand or snow, large magnetic declination variations (in extreme northern and southern latitudes) increase the difficulty.

Maps may be unreliable or nonexistent. Therefore, GPS and aerial photographs become an important source of terrain information.

With proper planning, engineer topographic units can convert areial photography into photomaps. However, unless aerial photographs are properly laid out, annotated, and referenced to known survey points, they will not be accurate enough for navigation and indirect-fire weapons.

Weather Variations

Sharp variations in weather are common in cold weather operations. Such include severe frosts, mild weather spells, thaws, rain, sudden freezing, snowstorms, strong winds, and dense fogs.

Rains can halt an attack by making off-road movement impossible. Conversely, a hard freeze

can make a defensive position vulnerable by converting soft lowlands, or even rivers, into avenues of approach.

Accurate weather forecasts are essential to guard against the harmful effects of weather and to seize tactical advantage. The division weather section and its weather prediction capabilities are extremely important. The commander must consider favorable conditions of even short duration as a combat power multiplier.

Seasonal Transition

Climatic changes are abrupt as seasons change. Winter field fortifications can become unusable. A frozen river may become a major obstacle as the ice breaks. Temporary roads and airfields disintegrate; permanent ones become unusable. Rivers flood. Terrain changes rapidly. Areas underlaid by permafrost become bogs. When possible, units should use air reconnaissance to determine possible routes for movement.

The freezing season is shorter and has less effect on movement than the break-up season. The best time for operations is when ground and waterways freeze sufficiently, but before deep snows arrive. Units must also alter camouflage patterns. Careful planning is essential.

In winter, clothing and shelter must protect against cold; in summer, they must protect against water, sun, and insects. Large numbers of mosquitoes are common in arctic regions during warmer months. They can severely impact operations if troops are not properly equipped.

Delayed Responses

Extreme cold increases the time required to perform even simple tasks. Everything is done at a slow pace and takes considerably more time. Troops conducting movements require additional time to adjust clothing and equipment and, many times, they must set up warming tents en route.

In cold weather, leaders must supervise soldiers to ensure they consume sufficient quantities of food and water. Also, soldiers often resist performing routine hygiene functions because of the extreme cold. Establishing buddy teams within an organization can assist in reducing cold weather injuries.

Operations

Errors or miscalculations in planning extreme cold weather operations may be disastrous and corrective action difficult. Synchronizing air and ground forces is more difficult in the cold.

Logistic support must include increased fuel, shelter, and clothing; the need for special equipment; and the need to modify standard items. Plans must provide for alternate means of supply and for increased use of air transport in supply and evacuation.

Soldiers will be able to move only the minimum of essentials. Austere living and self-sufficiency are critical to economy of supplies.

Reconnaissance

Operations in extreme cold are vulnerable to ambush and delaying tactics. Reconnaissance ahead and to the flanks of an advancing column is critical.

Detailed reconnaissance before committing the main force avoids delay, misdirection of effort, fatigue, and unnecessary exposure of troops to the cold. Reconnaissance troops must be mobile, but still carry life support equipment. They must maintain communications with the main body at all times.

Security

Short daylight hours and storms may restrict enemy and friendly air operations. However, the weather may also limit air and ground observation of the enemy.

Dense forests provide a natural screen against air observation for elements not using roads or familiar trails. In open, snow-covered areas, using white covering for clothing and equipment increases protection against observation.

Extreme cold decreases the importance of water obstacles. However, concentrated artillery fire, air bombing, or deliberately placed demolition charges can turn frozen areas of water back into obstacles or traps.

One foot of solid ice can support light tanks while from 3 to 4 feet of ice can support virtually any load. Snow over 18 inches deep limits or completely stops

wheeled combat vehicles except on cleared roads. It can also hamper operation of tracked vehicles.

Mines improperly placed will be ineffective in heavy snow as tanks press them deeper into snow without exploding them. If used, personnel should place mines on a hard surface beneath the snow.

Offensive Operations

The commander must consider climatic conditions and sudden weather changes in planning offensive operations. Heavy snow may fall during an operation, restricting movement and mobility. It can also hinder movement of the enemy's reserve.

A sudden thaw may prevent cross-country movement and cut off troops from adjacent friendly forces. Fog and low clouds can develop quickly and obscure observation. The commander should receive frequent weather reports to aid in decision making before and during operations.

If possible, attack forces should avoid heavy forests and snow drifts. Terrain corridors between wooded areas are preferable to stream valleys, as the latter usually contain deep snow drifts.

The objectives of the attack are critical terrain features which dominate the roads leading away from the enemy's position. Seizing them normally prevents withdrawal, reinforcement, or resupply and may cause the enemy's eventual surrender or annihilation.

Defensive Operations

In general, reasons for assuming the defense apply in all environments. Maneuver units may have to assume the defense because of extreme cold weather phenomena such as breakup, freezing, severe snowstorms, and extremely low temperatures.

Units may deliberately assume the defense to tempt (or compel) the enemy to attack under unfavorable conditions such as through long, narrow passes, deep snow, or across obstacles where movement is difficult and firepower ineffective. This would force the enemy to fight under exhausting conditions while the defender occupies better shelter and maintains shorter supply lines.

Destroying enemy shelter places him in immediate jeopardy. This can permit taking the offense as soon as the situation allows.

Wide, frozen streams and lakes afford little or no cover and provide excellent fields of fire for the defender. Under mild temperatures, keeping the ice of these lakes and streams broken up for a distance of from 20 to 30 feet from shore creates a difficult obstacle.

Heavily wooded areas and open areas relatively free of snow favor the attacker. Units must pay special attention to these areas and defend these areas in strength and in depth.

In conditions of extreme cold, a position's organization requires special tools and explosives. Ordinary entrenching tools are ineffective. A defensive position on the crest of a hill or ridge will usually be effective. Enemy tanks and personnel will have difficulty ascending a steep, snow-covered slope.

The defender holds his most mobile troops in reserve. Because of difficulties in rnovement, the commander should keep his reserves closer to the probable area of employment.

Maneuver units normally counterattack against the flank of an attacker. In deep snow, the enemy may be unable to change his orientation in time to meet a counterattack on his flank by mobile forces.

The defender continually improves LOCs. He opens paths between front-line positions and rear areas and in the directions of reserve employment. The commander should position reserve units to cover thoroughfares to prevent enemy use.

DESERT OPERATIONS

The term desert covers a wide field of arid environments, ranging from the rolling sands of the African Sahara to the mountainous and wadi-covered American Mohave. All have characteristics which can adversely affect military operations: lack of water, limited vegetation, large areas of sand, extremes in temperature, and brilliant sunlight. Field Manual 90-3 is the Army's base doctrine on desert operations.

The Desert Environment

Mountainous deserts have scattered ranges or areas of barren hills or mountains separated by dry, flat basins. Most of the infrequent rainfall occurs on high ground and runs off rapidly in the form of flash floods. These create deep gullies and ravines and deposit sand and gravel around the edges of the basins.

Rocky plateau deserts have relatively slight relief and extensive flat areas with solid or broken rock at or near the surface. They may have shallow, but sharply defined, steep-walled valleys called wadis. Although the flat bottoms and concealment of wadis may seem attractive as CP locations, they can be extremely dangerous because of flash flooding from rains that may occur many miles away.

Sand or dune deserts are extensive flat areas covered with sand or gravel. They may be totally flat for several kilometers or be covered by vast expanses of slowly migrating mounds of sand.

Plant life may vary from none to scrub brush over 6 feet high. Temperatures may exceed 100 degrees Fahrenheit during the day and fall to near freezing at night.

Impact on Operations

Mobility

The key to success in desert operations is mobility, clearly evident in ground operations in Operation Desert Storm. The tactics used to achieve victory over Iraq were wide, rapid flanking movements similar to those German Field Marshal E. J. E. Rommel and British Field Marshal B. L. Montgomery demonstrated in North Africa during WWII.

Trafficability and cross-country movement are critical to desert-operations tactics, and conditions are generally good. However, salt marshes can create no-go conditions during wet seasons.

Sand can bog down traffic and make foot movement slow and exhausting. The steep slopes of dunes and rocky mountains can make vehicle movement impossible.

Wadis, with steep and unconsolidated banks, create cross-compartmented terrain. When it rains, wadis become dangerously rushing streams of water, turning flat lake beds into seas of mud.

In rocky terrain, sharp angular debris easily punctures tires. But, overall, movement is mostly uninhibited. With ample fuel and water resources, units can go around natural as well as man-made obstacles.

With the desert's loose surface material, observers can easily detect movement because of the flying sand and dust. In an actual engagement, this cloud may obscure a unit, protecting it from direct fire as it advances. But the element of surprise is probably lost.

Moving at night maybe the logical choice. The dust is still there, and vehicles (which should be widely spaced) can get separated. But there is no worry about enemy detection from a dust column or the sun's rays reflecting on glass, mirrors, or metal. These can give away movement and positions at distances of up to 20 kilometers.

With the ability to make fast, wide, flanking movements, a unit can encircle and cut off enemy forces. The Israeli forces under General Ariel Sharon did just that to the Egyptian Third Army in the 1973 War. The British did the same to the Italians in North Africa in January 1941.

In Operation Desert Storm, night-fighting AH-64 helicopters, combined with FA fires, were an unbeatable team. An armored force raced to the Euphrates River and attacked Republican Guard positions, cutting off and destroying Iraqi divisions.

Land navigation is a challenge during movement in many arid regions. There are few landmarks, and maps and even photos can become dated quickly, especially in areas where dunes migrate. The GPS with the small, lightweight GPS receivers are a major aid for desert operations.

Refueling and resupply operations require periods in which forces assume the defense, but only temporarily. Compared to rocky plateau topography, the flat, sandy desert topography is not conducive to defense.

In mountains and canyons, a defensive posture can be favorable. Controlling passes can essentially close off vast areas and make an attack extremely costly.

While a unit is in the defense, it needs both ground and air reconnaissance to detect movements at long range and as early as possible. Units must place

obstacles in all types of topography, primarily to slow advances and channel columns. Neglecting these security measures in flat, sandy regions can lead to disaster.

Reports from commanders in Operation Desert Storm indicate that combat units engaged the enemy early and at the maximum ranges of weapons systems. In some cases, units used observed tires because the enemy could move so quickly. The observation helicopter (OH)-58, used with the AH-64 and long-range artillery systems, were the means to this end. But, generally, the Iraqis moved little, and unobserved fires, using IMINT, resulted in substantial destruction.

Observation and Fields of Fire

Observation and fields of fire are generally excellent in most desert areas. Open terrain and a predominantly clear atmosphere offer excellent long-range visibility and permit the use of direct-fire weapons to their maximum ranges. When there is no usable dominant terrain available, units can conduct observation from the air.

Range estimation by gut feeling may be subject to error. Weapons can easily reach their maximum effective ranges. Correct estimation of maximum ranges is critical for all weapons, especially for wire-guided munitions.

There are two primary considerations when using weapons in a desert environment: longer-range observation and fields of fire at the maximum effective ranges. However, rapid heating and cooling of the atmosphere can hinder these factors and cause distortion of ranges to both the aided and the unaided eye. Personnel must use mechanical and electronic means, such as GSRs and laser range finders to verify estimated ranges. Crews must bore sight and zero their weapons more frequently at standard ranges.

Even though the landscape appears flat, closer inspection may show it to be undulating with relatively deep wadis and depressions. Weapons must be sited to provide mutual support. Dead space may be a problem. Leaders must ensure their units cover these areas by indirect fire.

When on the offense, units should initiate attacks with the sun at or near the attacker's back, when possible. This eliminates most shadows that degrade optical weapons guidance and make visual target acquisition difficult. Units must avoid shines and reflections.

Heat distortion, resulting from heat waves at the desert surface, causes other visibility problems. Images shimmer, making positive identification difficult and degrading depth perception.

Range finders can help verify correct distances and bracketing techniques with large adjustments to hit an enemy target with artillery. If distortion renders optical vision hopeless, radars can be valuable and the haze of midday heat will unlikely affect them. However, radars are almost useless in sandstorms.

Image intensification, which depends on the phase of the moon at night, is also of limited value in sandstorms. If there is no moon, personnel use artificial illumination outside the system's field of view.

Because thermal imagery devices depend on the difference between ambient temperature and equipment temperature, they are more useful at night than during the day. Because of the distinct advantages, units should use them as the primary sighting systems for vehicles so equipped.

Observation of fires, especially direct fires by tanks, may be difficult because of dust clouds. Observers may encounter complications when trying to make correction to FA fires, especially those of larger pieces, by dust hanging in the air following the impact of ranging rounds. Forward observers should consider placing initial rounds beyond the target rather than short of the target.

Cover and Concealment

Cover and concealment are generally scarce in the desert. Flat, sandy deserts provide little if any natural cover or concealment, especially from aerial attack or reconnaissance.

Ground concealment and protection from fire can be found behind dunes or in wadis. When using wadis for ground concealment, soldiers must be aware of the potential for flash floods. Camouflage can be effectively employed to improve on natural cover and concealment.

Some arid regions have vegetation that can provide limited concealment from ground observation.

In rocky, mountainous deserts, cover and concealment are best behind boulders and in crevasses.

Daytime vehicle movement eliminates nearly any possibility of surprise, as enemy observers can spot dust trails for miles. Therefore, vehicle movement should occur mostly at night.

At night, noise and light discipline is critical. Sounds and light travel great distances across the unobstructed flatness and through the clear desert air.

Obstacles

Natural obstacles do exist in the desert, and man-made obstacles are effective in arid regions. Wadis and the steep slopes of escarpments, mountains, hills, and dunes hinder cross-country movement.

Sand dunes may stretch for miles and prevent direct movement across their length. Sand dunes are often more than 100 feet high and consist of loose sand with high, steep downwind faces that make vehicle traversing next to impossible.

In some areas, desert salt marshes have crusted tops that deceive vehicle drivers. These dry lake beds can become obstacles, especially in the wetter seasons when the water table is higher.

At times a top crust may form on the surface of a dry lake, but below the crust the soil is moist and similar to marsh conditions. The surface looks like it will have good trafficability, but the crust collapses with the weight of a vehicle, which becomes mired.

The high premium on fuel and time makes it costly to go around natural obstacles. Therefore aerial reconnaissance immediately before any large movement is highly advisable. For example, because sand dunes migrate with shifting winds, they might not be where maps or photographs show them.

Sandy deserts are ideal for employing minefields. Although windstorms can reveal previously buried mines, these mines can still channel movement and deny access to certain areas. (Minefields influenced the battles of the Bi'R Hacheim Line and El Alamein in Iraq.) Other obstacles include ditches, revetments, and barriers made by bulldozing sand mounds or by blasting in rocky, mountainous areas to close passes (the Bar Lev Line along the Suez Canal for example).

Key Terrain

Key terrain in the desert can be any man-made feature, a mountain pass, or a source of water, and of course, high ground. Because there are few man-made features in the desert, those that do exist can become important, perhaps even key.

Roads and trails are scarce in the open desert. Complex systems beyond simple commercial links are not necessary.

Routes joining oil or other mineral deposits to outlet collection points supplement road systems. Wells, pipelines, refineries, and quarrying and crushing plants may have strategic and tactical importance. Pipelines are often raised off the ground, inhibiting movement.

Rudimentary trails exist in most deserts. In many locations, ancient posts and forts, usually in ruins, invariably command important avenues of approach. They frequently dominate the only available passes in difficult terrain.

Passes through steep topography are also likely to be key, again because they are so few. The North African campaigns of WWII focused on the control of passes, specifically the Sollum and Halfaya. In the Sinai Wars between Egypt and Israel, the Mitla, Giddi, and Sudar passes were key. In Afghanistan, control of the mountain passes provided the Mujahideen safe haven from the Soviets.

Other key terrain features include oases and any high ground. Oases become important for water resupply. High ground is always a fair bet for key terrain. For example, the relative flatness and great distances of some deserts, such as in Iraq, make even a large sand dune a key feature.

Avenues of Approach

Avenues of approach do not have clear definitions in arid regions. The vast, relatively flat areas permit maneuver from virtually any direction. This point became obvious to units establishing defensive positions in Operation Desert Shield. Wide envelopments are also possible.

Modern sensor technology, limited natural concealment, and improved observation make the element of surprise a challenge. Yet, the coalition did achieve surprise during Operation Desert Storm. The presence of US tanks in defensive perimeters shocked Iraqi commanders.

Fuel is the major limitation when considering avenues of approach. The great distances a unit must travel to outflank enemy positions require huge amounts of fuel and complicate resupply.

In mountainous and canyon topography, avenues are much more limited; wadis and valleys are likely to be the only possible access routes. Any roads that do exist are probably in valleys. Nevertheless, none of these considerations preclude the use of such tactics.

Techniques for Operating Vehicles

The best time to drive on sand is at night or early morning when the sand is damp and traction is better. By reducing tire pressure, vehicles may gain some traction. However, prolonged driving on partially deflated tires overheats tires and breaks down sidewalls.

Evenly distributing loads helps operators control their vehicles. Also, operators must apply good driving skills to avoid harsh jolting of tires and extreme wear on tracks, wheels, springs, and shock absorbers.

Crossing dunes requires careful reconnaissance. Units should stay on the upwind side if possible. The wind may have built up sand around small scrubs forming small hills. Because of poor traction, wheeled vehicles should not attempt to move through areas where this has occurred.

Salt marshes are normally impassable, especially those with a dry crust of silt on top. A surface crust might cover sandy areas, which could impede travel.

To extract a sand-trapped vehicle, units should carry at least enough pierced steel planking or galvanized iron to put under, and allow traction for, the driving wheels. Also effective are canvas sand mats, preferably with lateral strips of metal for strength and traction.

Other essential emergency equipment includes jacks, jack blocks, tow ropes, shovels, axes, and picks for use in vehicle recovery. Winch-equipped vehicles should not normally lead movements; they should locate near the rear.

JUNGLE OPERATIONS

The US Army has a long history of fighting in jungles—in WWII, Vietnam, and most recently, Panama. Because Army contingency plans include operations in jungle areas, jungle warfare for the AASLT division remains a distinct possibility. Field Manual 90-5 is the Army's base doctrine for jungle operations.

Jungle Environment

Dense vegetation, high temperatures (averaging from 78 to 95 degrees Fahrenheit), high humidity (90 plus percent), and heavy rainfall (1,000 centimeters or 400 inches per year) characterize jungles. In jungles close to the equator, seasons are nearly alike. Further from the equator there are distinct wet (monsoon) and dry seasons.

Types of Jungles

Primary jungles are tropical forests with well-established trees. Primary jungles include tropical rain forests and deciduous forests.

Tropical rain forests have large trees whose branches interlock to form canopies. Canopies may form at two or three different levels and prevent sunlight from reaching the jungle floor. As a result, there is little undergrowth. This makes movement by foot easier than in other types of jungles. However, extensive above-ground roots, hanging vines, and soggy ground makes vehicle travel difficult. Observation from the air is nearly impossible and ground observation is difficult.

Deciduous forests are found in subtropical zones. In wet seasons, trees have their full foliage; in dry seasons much of the foliage dies. Trees are less dense than in a rain forest, with more sunlight and rain filtering to the jungle floor and, consequently, more undergrowth.

In the wet season, limited observation from the air and ground is normal and movement is more difficult. In the dry season, observation and trafficability improve.

Secondary jungles occur when the ground repeatedly gets exposed to the sun, such as at the edges of a primary jungle and in areas where humans have cleared and abandoned the jungle. Secondary jungles are overgrown with weeds, grasses, canes, and other vegetation. Foot movement is difficult, and the maximum ground observation is only a few meters.

Common Jungle Features

Jungle areas are not characterized solely by trees and undergrowth. In the tropics and subtropics, local jungle areas have special characteristics, including swamps, savannas, bamboo thickets, and active or abandoned cultivated areas.

Swamps occur in low jungle areas or depressions with poor drainage where water can gather. Movement is normally limited to foot and small boats. Air and ground observation is limited.

Savannas are broad, open grasslands where trees are scarce and grasses are thick and broad-bladed. Vehicle movement is easier in savannas than other jungle areas, but movement by foot is slow and tiring because of the tall, dense, sharp-edged grass. Observation varies from poor to good.

Bamboo grows throughout the tropics. Large bamboo thickets obstruct vehicle movement, and troop movement through bamboo is slow, tiring, and noisy.

Cultivated areas include rice paddies, plantations, and small farms. Generally, observation is less restricted in cultivated areas. Ease of movement varies.

Rice paddies are flat fields that are flooded during part of the year through a series of dikes and irrigation ditches. Paddies hinder foot movement when wet and generally prevent vehicle movement whether wet or dry.

Plantations are large farms where tree crops like rubber and coconut grow. The ordered rows of trees generally allow easy movement.

Small farms are created by cutting down and burning off existing jungle vegetation. Crops are grown for a few years, then the farms are typically abandoned. These abandoned farms may hinder movement when they become overgrown.

Jungle Operations Considerations

Jungle combat is characterized by long periods of developing the situation and looking for the enemy followed by short periods of violent and sometimes unexpected fighting. Jungle combat involves fewer conventional attacks and defenses and more ambushes, raids, and meeting engagements.

Heavy vegetation reduces observation and fields of fire, which makes high ground less significant as key terrain. Roads, rivers and streams, fording sites, and LZs are likely key terrain. However, operational orientation remains on the enemy rather than on retaining or controlling terrain.

The range of TOWs and DRAGONs is limited in dense jungle vegetation. Artillery fire support is difficult to observe and adjust. TACAIR and helicopter weapons systems provide an alternative to conventional artillery fire support.

Navigation and Mobility

Topographic survey of jungle areas is mainly by air. Jungle maps show large terrain features, but do not always show smaller features such as gullies, small swamps, and intermittent streams.

Older maps may be inaccurate, especially in depicting trails and clearings which can rapidly become overgrown. Aerial photographs and information from patrols, local inhabitants, and others who have been in the area can help update maps.

Heavy vegetation makes land navigation difficult. Moving through a jungle is difficult and slow. Thick vegetation and lack of roads hinder vehicle movement.

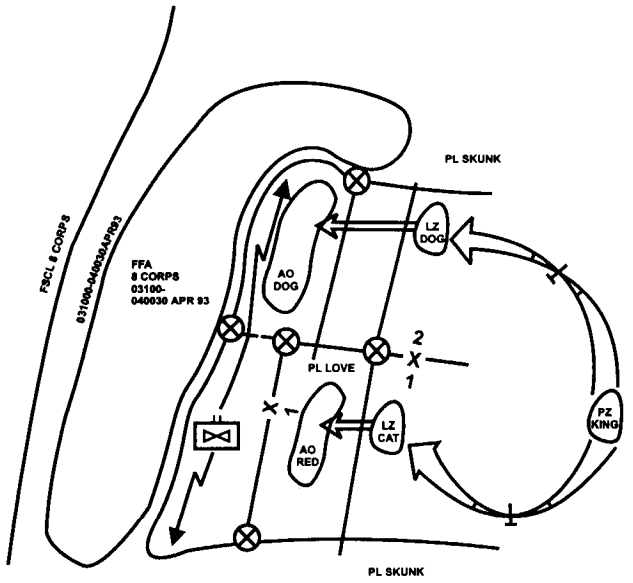
Dense vegetation, heat, and rugged terrain cause troops to tire quickly. Using a compass and an accurate pace count are vital.

If available, the best source of navigation is the GPS. However, dense jungle canopies may cause signal interference and limit GPS effectiveness.

Communications

The jungle environment has a negative effect on communications. The dense foliage reduces the range of both visual and sound communications.

Radio range is reduced, typically from 10 to 25 percent, because of thick foliage and rugged



Techniques:

- Units place a greater dependency on GPS and aerial observers as land navigation aids.
- Aerial observers provide course and route guidance.
- Graphics are tied to terrain features.
- Units may use phase lines as permissive FSCMs; shifting from one PL to another is event-driven.
- Units accomplish flexibility and control of indirect fires through an execution matrix.
- Boundaries are beyond maximum effective range of enemy and friendly direct fire weapons.
- Commanders position boundaries and restrictive fire control measures to allow immediate suppression missions, force protection, and security.
- Commanders achieve control by assigning responsibility for an AO.
- Brigades identify objectives within the commander's intent and available intelligence.
- The 2d Brigade in the north lacks information and intelligence on enemy strength and location.
- The 1st Brigade in the south has better information.
- Aviation initially screens across the entire front.
- A boundary change occurs (affecting aviation) when the 2d Brigade crosses PL Skunk.
- A combination of aerial observers and the GPS aid permissive fire control measures during movement.
- Units designate control measures by GPS location plus a specified distance.
- Lacking favorable conditions, units place greater reliance on aerial observers.

Figure 7–6. Example defensive jungle operations

terrain. Rain and humidity can cause communications equipment to fail.

Laying communications wire in a jungle takes time. Aircraft may be needed to assist in wire-laying operations.

Offensive Operations

The jungle environment poses several challenges for the attacker. Thick foliage hinders control. Seeing the battlefield is difficult and requires the coordinated use of security patrols, air and ground reconnaissance, and movement.

In a jungle, the momentum and speed of an attack are difficult to maintain. Thick vegetation makes it difficult to move and accurately fire heavy weapons. The jungle does, however, provide concealment for infiltration (Figure 7-6).

Defensive Operations

The density of jungle foliage impedes the detection of approaching enemy forces and slows

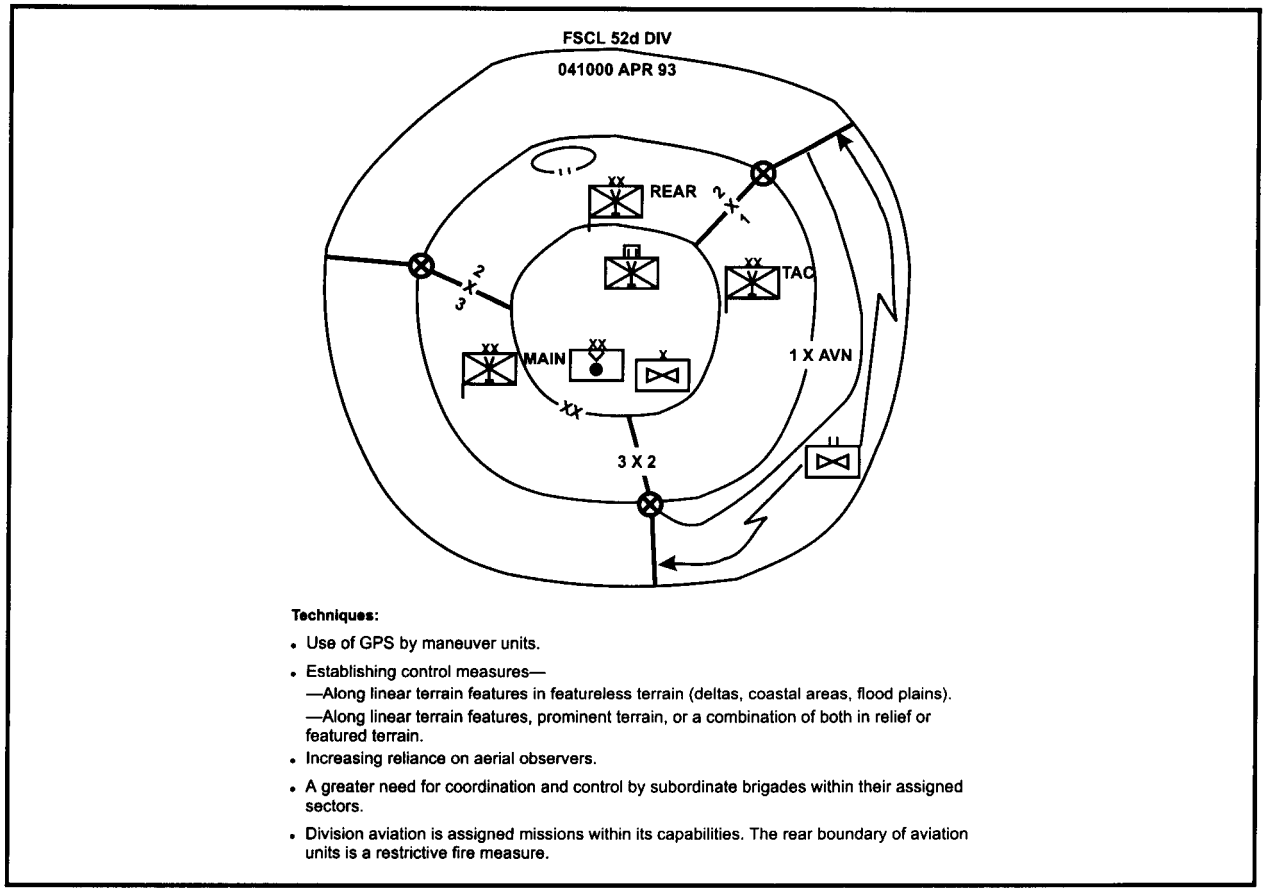


Figure 7–7. Example defensive jungle operation

movement in reaction to an attack. Because foliage limits fields of fire and decreases visibility, defensive positions normally must be carefully selected. The defending force must use OPs and NVDs to provide early warning, especially against infiltration attempts (Figure 7-7).

Combat Service Support

Lack of roads in the jungle hinders resupply and evacuation. In a jungle environment there are more litter cases than in other environments; even lightly wounded soliders may be unable to walk through dense undergrowth. Litter teams may be required to initially evacuate the wounded.

Air transport is critical, but not always available. Soldiers must be able to move with only minimum essential supplies. Austere living and self-sufficiency may be critical to jungle operations.

RETROGRADE RIVER CROSSING OPERATIONS

Many locations throughout the world have rivers that function as obstacles to military operations. Therefore, US forces may need to conduct retrograde river crossing operations. This section summarizes these operations. For more information see FM 90-13.

A retrograde river crossing is a special operation that requires detailed planning and support. Normally, the extent of the water obstacle and the enemy situation dictates just how to accomplish the crossing.

The force usually conducts a retrograde river crossing when enemy advances threaten to overwhelm the division. The commander responds by directing some form of retrograde operation.

While executing a retrograde operation, the division may be subjected to possible enemy pursuit. If so, the force conducts a retrograde river crossing to accomplish one of two objectives—to establish a new defense on the exit bank of the river, and/or to continue the retrograde to new defensive positions designated beyond the obstacle.

Retrograde river crossings are not merely offensive river crossings conducted in reverse. They are characterized by the following:

- They require detailed planning and centralized control.
- The enemy controls maneuver initiative.
- There is a high risk to friendly forces.
- Delaying forces must impede the enemy's advance to trade space for time at the crossing sites.
- Forces on the exit bank must provide defensive and overmatching fires.

The same amount of detailed planning associated with a deliberate offensive crossing must also be applied to a retrograde river crossing. For planning purposes, the crossing operation has three distinct actions-delay, defense, and crossing. They occur concurrently.

The delay's primary purpose is to trade space for time. Time gained allows the corps' main body to move across the river.

Corps elements not engaged in the delay execute a planned retirement or withdrawal and cross the river as quickly as possible. These elements are assigned various missions within the crossing area or in the defense which is established on the exit bank. Moving these elements toward and across the river must be consistent with the overall retrograde the entire corps is conducting to preclude the enemy's early detection of actual crossing sites.

The commander directs delay operations to continue until delay forces reach the battle handover or holding line. Repositioned units occupying assigned defensive positions on the exit bank then assume responsibility for the battle. Finally, the delay force disengages and begins its rearward crossing.

Establishing a strong exit bank defense in each division sector occurs at the same time as the execution of delay operations. The defense of the exit bank must be as strong as possible with the available troops. The defense's primary mission is to overwatch the crossing of the forces remaining on the far side of the river.

Once the commander directs defense forces to assume responsibility for the battle, they are expected to defeat, or at least contain, the enemy in a specified area. This is essential for successfully completing the crossing. As units engaged in delay operations negotiate the crossing, they are incorporated into the defense or prepare to assume the delay mission if further retrograde operations are warranted.

Because friendly forces control both banks of the river for some time before the operation, they should continually improve and repair existing bridges and crossing sites. They install or pre-position to the rear all available tactical bridging and rafting within the corps to supplement existing crossing means.

The activity begins with the actual crossings of CSS elements. These units evacuate all nonessential supplies and engage in prestocking delay and defense forces. Crossing sites within the rear area should be fully operational early in the retrograde to allow elements not involved in the delay to cross the river at the earliest possible time consistent with the tactical situation.

Characteristics of operations within the retrograde crossing area include—

- Rapid and controlled flow of traffic across the river.
- Maximum use of concealment and dispersal.
- Coordinated crossing of equipment and supplies.
- Coordination between defense and delay forces for use of crossing sites by the latter.

The difficulty of command, control, and coordination of retrograde crossings requires a clearly understood delineation of missions and tasks between delaying, defending, and support forces.

Because the enemy has the maneuver initiative, it is essential to employ deception operations as an integral part of the plan. Deception should be planned and executed to deceive the enemy regarding the retrograde. The deception story should conceal the location and the extent of crossing operations.